Amendments to th Specification:

Please replace paragraphs 12 to 14, 22, 24, 29, 34, 35, 37, 39, 41, 47, 50, 53, 54, 62, 63, 66, 73, 76 to 82, 86, 93 and 94 with the following amended paragraphs:

[0012] This process needs to be ~~completed~~ repeated until the last cell is formed and it is then topped off with a bus bar, insulator plate and the final end plate.

[0013] A problem in many fuel cell designs is that each flow field plate, necessarily, must have a network of flow field channels in communication with supply apertures defining the distribution channels for the appropriate fluid. Almost always, fuel cells are designed to provide flow through of reaction gases, to prevent build-up of impurities. Thus, for the reaction gases and coolant, each network of flow field channels is connected to at least two apertures or ports. Yet, at the same time, many designs require a seal to be provided between each flow field plate and the MEA, enclosing the MEA, and most importantly, providing a seal between the active area of the MEA and the apertures or ports. This requires a seal or gasket to pass over the flow field channel or connection portions ~~proving~~ providing a connection between the supply apertures and the main central or active portion of the flow field channels.

[0014] For any one reaction gas it is conceivable to provide a gasket ~~completing~~ completely enclosing all of the flow field channels and the supply apertures on the corresponding, first flow field plate. This will enable a good seal to be formed between that flow field plate and the MEA. However, on the other side of the MEA, it is necessary to provide a gasket completely encircling the aperture in a second flow field plate, for the reaction gas supplied to the first flow field plate. In this configuration, part of the membrane would lie over open channels on the first flow field plate, and hence not be properly supported, thereby running the risk of there being inadequate sealing, resulting in a mixing of gases, which as is known is highly undesirable.

a2 **[0022]** on the front side thereof, reactant gas flow ~~field~~ channels;

a3 **[0024]** for each aperture, at least one slot extending through the flow field plate from the back side to the front side thereof, to provide communication between the corresponding aperture extension and the reactant ~~action~~ gas flow channels.

a4 **[0029]** wherein the first flow field plate includes: first reactant gas flow channels on the front side thereof; first slots extending from the first reactant gas flow channels to the rear side thereof; for each of the first apertures thereof, on the rear ~~site~~ side thereof, a first aperture extension, providing communication between the first apertures thereof and said first slots; and

a5 **[0034]** Figures 3 and 4 show, respectively, front and rear views of an anode bipolar flow field plate of the fuel cell stack of Figures ~~5~~ 1 and ~~6~~ 2;

[0035] Figure 5 shows a plan view on an enlarged scale of a ~~the~~ portion ~~5~~ of Figure 4, showing one supply aperture in greater detail;

a6 **[0037]** Figure 6b shows a perspective view similar to Figure 6a, but on a larger scale;

a7 **[0039]** Figure 9 shows a plan view on an enlarged scale of a ~~the~~ portion ~~9~~ of Figure 8, showing one supply aperture in greater detail;

a8 **[0041]** Figure 10b shows a perspective view similar to Figure 10~~b~~a, but in a larger scale;

a9 **[0047]** Conventionally, for each pair of grooves of two facing plates in a fuel cell, some form of pre-formed gasket will be provided. Now, in accordance with an invention disclosed in U.S. Patent Application No.~~____~~ 09/854,362, the various grooves could be

connected together by suitable conduits to form a continuous groove or channel. Then, a seal material is injected through these various grooves, so as to fill the grooves entirely. The sealant is then cured, e.g. by subjecting it to a suitable elevated temperature, to form a complete seal. Both sealing techniques, or any other suitable sealing technique, can be used in a fuel stack of the present invention.

[0050] Between the current collectors 116, 118, there is a plurality of fuel cells. In this particular embodiment, there are ten fuel cells. Figure ~~5~~ 2, for simplicity, shows just the elements of one fuel cell. Thus, there is shown in Figure ~~5~~ 2 an anode flow field plate 120, a first or anode gas diffusion layer or media 122, a MEA 124, a second or cathode gas diffusion layer 126 and a cathode flow field plate 130.

[0053] In the following description, it is also to be understood that the designations "front" and "rear" with respect to the anode and cathode flow field plates 120, 130, indicates their orientation with respect to the MEA. Thus, "front" indicates the face towards the MEA; "rear" indicates the face away from the MEA. Consequently, in Figures ~~9~~ 7 and ~~10~~ 8, the configuration of the ports is reversed as compared to Figures ~~7~~ 3 and ~~8~~ 4.

[0054] Reference will now be made to Figures 3 to 6, which show details of the anode bipolar plate 120. As shown, the plate 120 is generally rectangular, but can be any geometry, and includes a front or inner face 132 shown in Figure ~~7~~ 3 and a rear or outer face 134 shown in Figure ~~8~~ 4. The front face 132 provides channels for the hydrogen, while the rear face 134 provides a channel arrangement to facilitate cooling.

[0062] To provide a connection through the various flow field plates and the like, a connection aperture 160 is provided, which has a width of 0.25", rounded ends with a radius of 0.125" and an overall length of 0.35". As shown, in Figure 3, the connection aperture 160 is dimensioned so as to clearly intercept the groove segments 152, 154. This configuration is also found in the end plates, insulators and current collection

plates, as the connection aperture 160 continues through to the end plates and the end plates have a corresponding groove profile. It is seen in greater detail in Figures 12 and 15, and is described below.

a12 end

[0063] The rear seal profile of the anode flow field plate is shown in Figure ~~8~~ 4. This includes side grooves 162 with a larger width of 0.200", as compared to the side grooves on the front face. Around the air aperture 136, there are groove segments 164 with a uniform width also of 0.200". These connect into a first groove junction portion 166.

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[0066] An innermost groove segment 174, for the aperture 140 is set in a greater distance, as compared to the groove segment 155. This enables flow channels 176 to be provided extending under the groove segment 155. Transfer slots 178 are then provided enabling flow of gas from one side of the flow field plate to the other. As shown in Figure 3, these slots emerge on the front side of the flow field plate, and a channel network is provided to distribute the gas flow evenly across the front side of the plate. The complete rectangular grooves around the apertures 136, 138 and 140 in Figure ~~8~~ 4 are designated 182, 184 and 186 respectively.

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[0073] Thus, for the anode end plate 102, there is a groove network 190, that corresponds to the groove network on the front face of the anode flow field plate 120. Accordingly, similar reference numerals are used to designate the different groove segments of the anode and ~~anode~~ cathode end plates 102, 104 shown in detail in Figures 11-13 and 14-15, but identified by the suffix "e". As indicated at 192, threaded bores are provided for receiving the tie rods ~~132~~ 131.

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[0076] Correspondingly, the cathode end plate is shown in detail in Figures 14 and 15, with Figure 15, as Figure 12, showing connection through to the groove segments. The groove profile on the inner face of the cathode end plate corresponds to

the groove profile of the anode flow field plate. As detailed below, in use, this arrangement enables a seal material to be supplied to fill the various seal grooves and channels. Once the seal has been formed, then the supply conduits for the seal material are removed, and closure plugs are inserted, such closure plugs being indicated at 200 in Figure ~~5~~ 2.

[0077] Now, the seals of the present invention can be conventional gaskets, or seals formed by injecting liquid silicone rubber material into the various grooves between the different elements of the fuel stack, as disclosed and claimed in U.S. Patent Application ~~________~~09/854,362.

[0078] In use, the fuel cell stack 100 is assembled with the appropriate number of fuel cells and clamped together using the tie rods 131. The stack would then contain the elements listed above for Figure ~~5~~ 2, and it can be noted that, compared to conventional fuel cell stacks, there are, at this stage, no seals between any of the elements. However insulating material is present to shield the anode and cathode plates touching the MEA (to prevent shorting) and is provided as part of the MEA. This material can be either part of the Ionomer itself or some suitable material (fluoropolymer, mylar, etc.). An alternative is that the bipolar plate is non-conductive in these areas.

[0079] If any leaks are detected, the fuel cell will most likely have to be repaired. The fuel cell stacks can have a wide range for the number of fuel cells in the stack. The number of cells can vary from one to a hundred, or conceivably more. Where, individual cells can be robustly sealed and/or seals can be readily replaced, this may have advantages. The fuel cells can be sealed using a seal in place technique disclosed in co-pending U.S. Patent Application No. ~~______~~09/854,362.

[0080] Also, fuel cell stacks with a single fuel cell or only a few fuel cells can be formed and these may require more inter-stack connections, but it is intended that this

will be more than made up for by the inherent robustness ~~of~~ and reliability of each individual fuel cell stack. The concept can be applied all the way down to a single cell unit (identified as a Membrane Electrode Unit or MEU) and this would then conceivably allow for stacks of any length to be manufactured.

[0081] This MEU is preferably formed so a number of such MEU's to be readily and simply clamped together to form a complete fuel cell stack of desired capacity. Thus, an MEU would simply have flow field plates, whose outer or rear faces are adapted to mate with corresponding faces of other MEU's, to provide the necessary functionality. Typically, faces of the MEU are adapted to form a coolant chamber of cooling fuel cells. One outer face of the MEU can have a seal or gasket preformed with it. The other face could then be planar, or could be grooved to receive the preformed seal ~~on the other MEU. This outer seal or gasket can be formed simultaneously with~~ the formation of the internal seal, injected-in-place in accordance with U.S. Patent Application No. ~~________~~09/854,362. For this purpose, a mold half can be brought up against the outer face of the MEU, and seal material can then be injected into a seal profile defined between the mold half and that outer face of the MEU, at the same time as the seal material is injected into the groove network within the MEU itself. To form a complete fuel cell assembly, it is simply a matter of selecting the desired number of MEU's, clamping the MEU's together between endplates, with usual additional end components, e.g. insulators, current collectors, etc. The outer faces of the MEU's and the preformed seals will form necessary additional chambers, especially chambers for coolant, which will be connected to appropriate coolant ports and channels within the entire assembly. This will enable a wide variety of fuel cell stacks to be configured from a single basic unit, identified as an MEU. It is noted, the MEU could have just a single cell, or could be a very small number of fuel cells, e.g. 5. In the completed fuel cell stack, replacing a failed MEU, is simple. Reassembly only requires ensuring that proper seals are formed between adjacent MEU's and seals within each MEU are not disrupted by this procedure.

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[0082] Referring to Figures 3-6, these show details of the gas flow arrangement in accordance with the present invention, for the anode flow field plate. Firstly, it is to be noted that at the front of the anode flow field plate, generally ~~indicates~~ indicated at 132, all of the apertures 136-141 are closed off from the flow channels. To provide flow of hydrogen, fuel gas, the transfer slots 178 are provided, extending through to the rear or backside of the anode flow field plate 120. As shown in Figures 3, 4, 5 and 6, each of the apertures 140, 141 includes an aperture extension 210 that extends under the inner grooves segments 155, 155a. The groove network 142 on the front face includes groove portions on sealing surface portion that enclose the apertures 140, 141, and separate them from a main active area including the slots 178. On the rear side, groove portions or sealing surface portions enclose both the apertures 140, 141 and the slots 178. Each of these aperture extensions includes projections 212, defining flow channels ~~214~~ 176, providing communication between the respective aperture 140, 141 and the transfer slots 178.

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[0086] For the apertures 136, 137 for flow of air or other oxidant, again, aperture extensions 220 and 220a are provided. Corresponding to the apertures ~~140~~ 136, ~~141~~ 137 these extensions 220 and 220a extend under the groove segments 150, 150a to provide support for them. Rear groove segments 164, 164a on the rear face of the plate 120 are then offset inwardly. Corresponding to the projections 212, projections 222 are provided, complementing the projections on the cathode flow field plate, as detailed below.

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[0093] Turing now to Figures 11 and 14, these show rear views of the anode and cathode end plates 102, 104. As shown, these are provided with sealed configurations, indicated by groove network 190 ~~on~~ in Figure 11 and 190' ~~on~~ in Figure 14.

[0094] As shown, on each of the end plates 102, 104, the ports 106, 107, 110 and 111 open into chambers, which are provided with extensions ~~indicated at 240~~.

These extensions ~~240~~ corresponded~~ed~~ to the aperture extensions 210, 220, 230, 240 on the anode and cathode flow field plates 120, 130. Ports 108, 109 open into a main chamber provided with flow channels for the coolant, again with a pattern corresponding to the flow pattern on the rear of the anode and cathode flow field plates 120, 130 respectively.

In the abstract

Please replace the abstract with the following, amended abstract:

A flow field plate for a fuel cell has, on the front side thereof, flow channels for a reactant gas. At least two slots extending from the front thereof to the rear side. On the rear side, for each of the two apertures for the reactant gas, there is an aperture extension, providing a flow path from each aperture to a respective slot. ~~The~~This enables sealing surfaces~~,~~ on the two surfaces to be offset so as to be fully supported, and to be located on opposite sides of corresponding slots. The arrangement avoids having to provide seal or gasket portions crossing flow channels and ensures that all portions of each gasket are properly supported.